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ABSTRACT

The study compares the performance of 50 fourth grade learning disabled students on the Wechsler Intelligence Scale for Children-Revised (WISC-R) and the Tests of Cognitive Abilities from the Woodcock-Johnson Psycho-Educational Battery (WJTCA). Results indicated that learning disabled Ss performed more poorly on the Tests of Cognitive Abilities than on the WISC-R. Data relative to a number of possible explanations for these results are reported including that the WJTCA may be more closely related to achievement than the WISC-R. (Author/DB)

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University of Minnesota

Research Report No. 36

A COMPARISON OF THE WISC-R AND THE WOODCOCK-JOHNSON TESTS OF COGNITIVE ABILITY

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Institute for Research on Learning Disabilities

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I. Adequacy of Norm-Referenced Data for Prediction of Success

II. Computer Simulation Research on the Assessment/Decision-making/Intervention Process

III. Comparative Research on Children Labeled LD and Children Failing Academically but not Labeled LD

IV. Surveys on In-the-Field Assessment, Decision Making, and Intervention

V. Ethological Research on Placement Team Decision Making

VI. Bias Following Assessment

VII. Reliability and Validity of Formative Evaluation Procedures

VIII. Data-Utilization Systems in Instructional Programming

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July, 1980

Abstract

This study compares the performance of learning disabled students on the WISC-R and the Tests of Cognitive Abilities from the Woodcock-Johnson Psycho-Educational Battery. Results indicated that learning disabled subjects performed poorer on the Tests of Cognitive Abilities than on the WISC-R. Data relative to a number of possible explanations for these results are reported.

A Comparison of the WISC-R and the Woodcock-Johnson Tests of Cognitive Ability

The recent publication of the Woodcock-Johnson Psycho-Educational Battery (1977) and its rapid acceptance by educational professionals has preceded research on the test by independent investigators. While the Woodcock-Johnson has been carefully constructed by its authors, with careful attention paid to issues of technical adequacy (i.e., norms, reliability, and validity), the battery must be carefully examined by others.

One such examination has taken place in a study by Reeve, Hall, and Zakreski (1979). Using a sample of 51 school-identified learning disabled students (43 males, 8 females), ranging in age from 7-2 to 11-5 years of age, the authors sought to determine the concurrent validity of one part of the battery, the Tests of Cognitive Ability (WJTCA). Specifically, Reeve et al. compared the performance of their learning disabled sample on the WJTCA to their performance on another commonly accepted measure of cognitive ability, the Wechsler Intelligence Scale for Children - Revised (WISC-R).

They reported some very interesting findings. First, the correlation of the sample's performance on the two tests was .79, "precisely the same as that reported by Woodcock" (Reeve et al., 1979, p. 66). Second, on the WJTCA, the learning disabled sample scored approximately one standard deviation below their mean on the WISC-R. Reeve et al., while addressing the educational ramifications of such findings, offered a number of possible explanations for the discrepancies in the two means.

First, they suggested that the WJTCA "taps an area of cognitive functioning in which children with learning problems have greater difficulty than children from the standardization sample" (p. 68). They stated that the area in which the LD subjects may perform poorly could be the WJTCA Cluster of Perceptual Speed. Reeve et al. posited this in light of the fact that their sample scored "dramatically lower" on that cluster, a cluster that may measure a skill area not contained in the WISC-R.

Another possible explanation offered by Reeve et al. was that the norms could be in error since they used only standard scores with a mean of 100 and standard deviation of 15 instead of other possible derived scores. In addition, scoring errors could have resulted in lower scores.

This study compares the WJTCA and the WISC-R, with emphasis on their intercorrelation and mean differences. Its data are also used to address Reeve et al.'s contentions for these differences.

Method

Subjects

Subjects were 40 male and 10 female fourth-graders from metropolitan Minneapolis and St. Paul schools. They were identified as learning disabled by placement teams in the school districts they attended. The average standard score achievement level for this group, obtained from the Peabody Individual Achievement Test (PIAT) total score, was 91.9 (SD = 8.78) and indicated underachievement. The average intelligence test score for this group, as indicated by the Wechsler Intelligence Scale for Children - Revised was 100.04 (SD = 12.45). Subjects were

selected for participation in the present study within six months of their identification as learning disabled. This restriction in subject selection was used in order to reduce the effect of the intervention. Selected demographic information on the subjects is presented in Table 1.

Insert Table 1 about here

Data Collection Procedures

Pupils were assessed as part of a larger study comparing the test performance of learning disabled students to that of a group of 49 underachieving non-learning disabled students. Data from other standardized tests in the domains of achievement (Peabody Individual Achievement Test, Stanford Achievement Test--mathematics computation and mathematics concepts subtests), and perceptual-motor functioning (Bender Visual-Motor Gestalt Test, Developmental Test of Visual-Motor Integration), were collected concurrently. Students were tested in either three or four one and one-half hour sessions.

Results

Correlations between the cluster scores of the WJTCA and the three major scores of the WISC-R are presented in Table 2. The correlation between the WISC-R Full Scale and WJTCA Broad Cognitive Scale of .67 is somewhat lower than the findings of .79 reported by both Reeve et al. (1979) and Woodcock (1978). It should be noted that the correlations reported by Reeve et al. were for subjects of a wide age range. Woodcock's correlations were derived from separate samples of third-graders and fifth-graders, with both groups showing exactly the same correlation

between the tests' major scales. This study's sample was a restricted range of fourth graders. This study does replicate other correlational findings of Reeve et al. (1979). For example, in this sample, the correlations of the WJTCA with the WISC-R Full Scale and the Verbal Scale are exactly the same (.67). While Reeve's correlations were higher, both the Verbal and Full Scale WISC-R scores showed the exact same relationship to the WJTCA Broad Cognitive score. This sample's performance on the WJTCA clusters also showed a greater relationship to the Verbal Scale of the WISC-R than to the Performance Scale, much like Reeve et al.'s results, suggesting perhaps a high loading of verbal factors. Two clusters were excepted from this rule. Memory, which had a slight degree of relationship to the Verbal Scale (.25) had virtually no relationship to the Performance Scale (.06). Perceptual Speed, which correlated .33 with the WISC-R Verbal, showed a greater relationship to the Performance Scale (.43), quite similar to the findings of Reeve et al. of .32 and .40, respectively.

Insert Table 2 about here

Table 3 lists the means and standard deviations for the scales of the WISC-R and the WJTCA. The learning disabled sample's performance was 7.68 points (more than one-half of a standard deviation) lower on the WJTCA Broad Cognitive than on the WISC-R Full Scale. Again, while the magnitude of the mean difference between the two scales is lower in this sample than the mean difference reported by Reeve et al., the difference between tests must be considered statistically (t = 5.00,

$p < .001$) and practically significant.

Insert Table 3 about here

Finally, in an attempt to ascertain the relationship between specific clusters of the WJTCA and the difference score between the WISC-R Full Scale and WJTCA Broad Cognitive Scale, the correlations of cluster scores and the between-tests' differences are listed in Table 4. A poor performance on the Memory Cluster shows the highest relationship to the between-test differences in scores.

Insert Table 4 about here

Discussion

These results confirm many of the conclusions reached by Reeve et al. (1979). Specifically, the data presented in this study attest to the fact that approximately 45 percent of the measured variance is shared by the two tests. Additionally, the cluster scores of the WJTCA are highly related to the WISC-R Verbal Scale, with the exception of the Perceptual Speed and Memory clusters.

These data also confirm the poorer performance of learning disabled students on the WJTCA than on the WISC-R. Given the results of this study and the Reeve et al. study, it is obvious that a student's performance on one test may not be the same as on the other test. Only 23 subjects were within ± 5 points of each other on the Woodcock-Johnson Broad Cognitive Scale and the WISC-R Full Scale. Nineteen subjects had a ± 10 or more point difference between their scores on the two scales.

As Reeve et al. (1979) argue, "the point to be made is that the labeling and placement of children viewed as having learned problems could well be a function of the assessment instrument used rather than the kind and quality of performance assessed" (p. 68).

Reeve et al.'s hypotheses for these differences were not confirmed in this sample. In their sample, Perceptual Speed was significantly lower than all of the other WJTCA cluster scores and was therefore identified as possibly explaining the discrepancy between the two tests. This explanation must be disputed for a number of reasons. First, in this study, as can be seen in Table 3, Perceptual Speed is not "obviously" lower than the other scores. Indeed, it is approximately equal to the mean of the Broad Cognitive Scale as well as the other clusters. Second, quite unlike the WISC-R where all the subtests are unit-weighted and therefore contribute equally to the total score, the WJTCA is constructed differently. The Perceptual Speed cluster, in and of itself, contributes nothing to the Broad Cognitive Score. Instead, the subtests that comprise Perceptual Speed, i.e., Spatial Relations and Visual Matching, are differentially weighted. They are then combined with all the other subtests, also weighted differentially, to contribute to the Broad Cognitive score. In actuality, the subtests comprising Perceptual Speed contribute little to the total Broad Cognitive Score. Finally, the results of Table 4 show the group's performance on Perceptual Speed to be very unrelated to the difference in scores on the WISC-R and WJTCA.

Reeve et al.'s second hypothesis was that the norms were in error or systematic scoring errors occurred. The possibility of systematic

error in the norms cannot be excluded based upon the published data so far. Ysseldyke, Algozzine, Shinn, and McGue (1979), as part of a larger study, compared the performance of low achieving students on the WISC-R and WJTCA. The mean difference (4.55 points) in that study for low achieving students was less than the mean difference reported in this study (7.68) for LD students. Still, a difference between the means of the two tests exists, possibly due to error in the norms.

Two other explanations can be offered to justify the inferior performance of learning disabled students. Reeve et al.'s notion that the WJTCA taps different areas, ones in which learning disabled subjects perform poorly, may be true, but in a different way than the authors perceive it. We believe that the "deficient" area of "cognitive functioning" is in fact achievement.

The results obtained in this investigation and in the earlier study by Reeve et al. (1979) begin to make sense when viewed within the comparable theoretical perceptions of tested intelligence developed by Cattell (1963) and Newland (1971). Both Cattell and Newland state that cognitive measures differ in the kinds of behaviors they sample. Some tests sample primarily what Newland labels as processes necessary to the acquisition of academic skills and what Cattell calls measures of fluid intelligence. Other tests sample primarily what has been learned, what Newland and Cattell label as product-dominant and crystallized intelligence, respectively. Woodcock (1979) has argued that the WJTCA is more a measure of scholastic aptitude than of "intelligence," and more closely related to achievement than is the WISC-R. In other words, the WJTCA taps more of what Newland labels product and Cattell labels crys-

tallized intelligence. Close examination of the subtest composition of the WJTCA reveals many subtests that could be classified as product dominant. For example, the Picture Vocabulary subtest directly measures the number of pictures the subject has learned to identify. In a similar manner, Quantitative Concepts measures what a subject has learned about the use of numbers. If the WJTCA is truly a product dominant measure, would it not be obvious that a student referred for low achievement would do poorly? The deck is stacked in favor of the kinds of findings obtained in this study and the study by Reeve et al. (1979).

Further information would clarify this issue. A subtest by subtest comparison of the learning disabled sample's performance with the norm group to determine which subtests differentiated the groups would be useful. Would those subtests be the process or product dominant ones? At this point, the confirmation of such a hypothesis is unattainable due to the lack of subtest norms.

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Footnote

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Table 1

Description of Subjects on Selected Demographic Variables[a]

Sex of child	Male	40	Female	10
Parental marital status	Married	26	Unmarried	9
Age of child in months	$\bar{X}$	121.04	S.D.	5.04
Father's SES	$\bar{X}$	58.32	S.D.	25.84
Mother's SES	$\bar{X}$	47.56	S.D.	24.16
Family income	$\bar{X}$	$21,423	S.D.	$10,477

[a]SES was determined using Otis Dudley Duncan's Occupational Socioeconomic Index (Duncan, O. D., A socioeconomic index for all occupations. In A. J. Reiss, Jr. (Ed.), Occupations and social status. New York: Free Press of Glencoe, 1961).

Table 2

Correlation Between Major Scales on WJTCA and WISC-R

	WISC-R		
WJTCA	Full Scale	Verbal	Performance
Broad Cognitive	.67	.67	.48
Reading Aptitude	.55	.59	.35
Written Language Aptitude	.56	.51	.46
Math Aptitude	.69	.70	.48
Knowledge Aptitude	.64	.65	.45
Verbal	.61	.66	.38
Reasoning	.50	.50	.35
Memory	.18	.25	.06
Perceptual Speed	.44	.33	.43

Table 3

Means and Standard Deviations for WJTCA and WISC-R

		Mean	Standard Deviation
WISC-R	Full Scale	100.04	12.45
	Verbal Scale	96.78	12.66
	Performance	104.12	13.74
WJTCA	Broad Cognitive	92.36	11.37
	Reading Aptitude	90.90	13.35
	Math Aptitude	90.30	11.63
	Written Language Aptitude	88.68	11.48
	Knowledge Aptitude	88.32	12.01
	Verbal	92.70	12.81
	Reasoning	101.68	17.77
	Memory	92.18	15.44
	Perceptual Speed	93.38	12.53

Table 4

Relationship of Major WJTCA Clusters to

WISC-R - WJTCA Differences

Clusters	Difference
Reading Aptitude	-.29
Math Aptitude	-.12
Written Language Aptitude	-.22
Knowledge Aptitude	-.22
Reasoning	-.18
Verbal Ability	.02
Perceptual Speed	.16
Memory	-.43

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